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ORIGINAL ARTICLE

Association between family structure, maternal education level, and maternal employment with sedentary lifestyle in primary school-age children[☆]**Francisco Vázquez-Nava^{a,*}, Norberto Treviño-García-Manzo^b, Carlos F. Vázquez-Rodríguez^c, Eliza M. Vázquez-Rodríguez^d**^aPhD, Departamento de Investigación, Facultad de Medicina de Tampico “Dr. Alberto Romo Caballero”, Universidad Autónoma de Tamaulipas (UAT), Tampico, Mexico^bMSc, Secretaría de Salud del Estado de Tamaulipas, Tamaulipas, Mexico^cMD, Hospital General de Zona No 32 Minatitlán, Instituto Mexicano del Seguro Social, Veracruz, Mexico^dMD, Facultad de Medicina “Miguel Alemán V” - Región Veracruz, Universidad Veracruzana, Veracruz, Mexico

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KEYWORDSObesity;
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Cross-sectional studies**Abstract****Objective:** To determine the association between family structure, maternal education level, and maternal employment with sedentary lifestyle in primary school-age children.**Method:** Data were obtained from 897 children aged 6 to 12 years. A questionnaire was used to collect information. Body mass index (BMI) was determined using the age- and gender-specific Centers for Disease Control and Prevention definition. Children were categorized as: normal weight (5th percentile \leq BMI < 85th percentile), at risk for overweight (85th \leq BMI < 95th percentile), overweight (\geq 95th percentile). For the analysis, overweight was defined as BMI at or above the 85th percentile for each gender. Adjusted odds ratios (adjusted ORs) for physical inactivity were determined using a logistic regression model.**Results:** The prevalence of overweight was 40.7%, and of sedentary lifestyle, 57.2%. The percentage of non-intact families was 23.5%. Approximately 48.7% of the mothers had a non-acceptable educational level, and 38.8% of the mothers worked outside of the home. The logistic regression model showed that living in a non-intact family household (adjusted OR = 1.67; 95% CI = 1.04–2.66) is associated with sedentary lifestyle in

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PALAVRAS-CHAVE

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overweight children. In the group of normal weight children, logistic regression analysis show that living in a non-intact family, having a mother with a non-acceptable education level, and having a mother who works outside of the home were not associated with sedentary lifestyle.

Conclusion: Living in a non-intact family, more than low maternal educational level and having a working mother, appears to be associated with sedentary lifestyle in overweight primary school-age children.

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Associação entre estrutura familiar, nível de escolaridade e emprego da mãe com estilo de vida sedentário em crianças em idade escolar primária

Resumo

Objetivo: Determinar a associação entre a estrutura familiar, o nível de escolaridade e emprego da mãe com o estilo de vida sedentário em crianças em idade escolar primária.

Método: Foram obtidos os dados de 897 crianças com idade entre 6-12 anos. Foi utilizado um questionário para registrar as informações. O índice de massa corporal (IMC) foi determinado utilizando-se a definição específica para idade e sexo do Centro de Controle e Prevenção de Doenças. As crianças foram classificadas como: peso normal (5°-85° percentil), risco de sobrepeso (percentil $\geq 85^\circ$ e $< 95^\circ$), sobrepeso (percentil $\geq 95^\circ$). Para análise neste estudo, sobrepeso foi definido como IMC igual ou acima do 85° percentil para cada sexo. As razões de chance ajustadas (RCs ajustadas) foram determinadas para inatividade física utilizando o modelo de regressão logística.

Resultados: A prevalência de sobrepeso foi de 40,7%, e estilo de vida sedentário, 57,2%. O percentual de famílias de pais separados foi de 23,5%. Aproximadamente 48,7% das mães apresentaram um nível de escolaridade não aceitável, e 38,8% eram mães que trabalhavam fora de casa. Os resultados do modelo de regressão logística mostram que o fato de viver em um ambiente familiar com pais separados (RCs ajustadas = 1,67; IC de 95% = 1,04-2,66) está associado ao estilo de vida sedentário em crianças com sobrepeso. No grupo de crianças com peso normal, a análise de regressão logística mostra que viver em uma família com pais separados, com a mãe apresentando nível de escolaridade não aceitável e/ou trabalhando fora de casa, não eram fatores associados a estilo de vida sedentário.

Conclusão: Morar com uma família de pais separados, mais do que ter um baixo nível de escolaridade materno e uma mãe que trabalha fora, parece estar associado a um estilo de vida sedentário em crianças com sobrepeso em idade escolar primária.

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Introduction

Obesity and physical activity in children constitute important health problems worldwide.

Recent reports show that the prevalence of childhood overweight and obesity is as high as 41%, and has been associated with the development of cardiovascular and orthopedic diseases, among others.¹⁻⁶ The study of the etiology of obesity has allowed for the identification of some risk factors, among which heredity, eating disorders, maternal employment, and sedentary lifestyle are highlighted.^{4,7,8} However, the management of this health problem is not clear, since various studies demonstrate an increase in the prevalence and incidence of overweight and obesity worldwide.^{1,3}

Sedentary lifestyle, defined as the lack of physical activity for at least 30 min three times a week, has been identified as an important risk factor for the development of various diseases, including cardiovascular diseases and obesity.⁸⁻¹⁰ According to recent studies, physical activity in children has decreased over recent few years.^{8,10}

Preventing childhood obesity could significantly benefit quality of life and lighten the burden of health care institutions. One priority for the control of the obesity epidemic is to identify risk factors, but the main priority is to understand the circumstances that favor the development and presentation of these factors, such as childhood physical inactivity. One significant proposal is that lack neighborhood safety and the presence of obese parents and those who do not practice sports favor

physical inactivity in children.^{11,12} However, the relationship between familial structure, maternal educational level, and maternal employment outside of the home with physical inactivity, restrictive to primary school-age children, needs to be further studied. Understanding how the magnitude of some familial aspects, particularly those of the mother, are associated with physical inactivity in childhood can help to develop better strategies to reduce the indices of sedentary lifestyle and consequently of obesity.

Various studies demonstrate that living in a non-intact family household,^{13,14} having parents with a low educational level,^{2,15} or having a mother who works outside of the home^{13,16} favors the development of habits and risk behaviors for health in children and adolescents.¹⁷ It is clear that the temporary or permanent absence of one or both of the biological parents in the child's home can favor the acquisition of certain habits and risk behaviors for health, including physical inactivity. One priority for reducing these indices in children with physical inactivity is to understand the degree to which some familial circumstances influence such risk behaviors. Accordingly, this study was designed to determine the association between family structure, maternal education level, and maternal employment with sedentary lifestyle in primary school-age children.

Methods

A cross-sectional study was conducted based on a sample of 897 children (474 males and 423 females) aged 6-12 years. The study took place in the urban Tampico-Madero-Altamira area of Tamaulipas state in Mexico, located 542 km northeast of Mexico City.

The children who participated in this study were recruited from eight different public and private elementary schools (first to sixth grade) located in the urban area. Permission was obtained for conducting the project from the corresponding educational authorities. A list of all enrolled children was requested from each of the selected schools. Schools and children were randomly selected. Exclusion criteria were those related to medical conditions that precluded physical examination, or refusal to participate. The study was conducted in 2011. Physical examinations performed included weight and height measurements.

Questionnaires were used to obtain the children's demographic data, dietary habits, and physical activity.

At the time of the interview, the children's parents or guardians were questioned concerning the time devoted by the children to watching television or playing video games during a typical day.

A platform scale was used to weigh the children, and was calibrated prior to each weight measurement. Weighing was carried out with the child dressed in a minimum amount of clothing, which permitted the children to stand erect and relaxed. Weight was considered to the nearest 100 g. Height was measured with a stadiometer. This measurement was conducted with the child barefoot, maintaining the head in a neutral position, with the neck, spinal column, and knees

in physiological extension and the soles of both feet fully supported on a horizontal surface.

Body mass index (BMI), calculated as kg/m², was determined using the age- and gender-specific Centers for Disease Control and Prevention (CDC) definition.¹⁸ Children were categorized as follows: normal weight (5th percentile \leq BMI < 85th percentile), at risk for overweight (85th \leq BMI < 95th percentile), and overweight (\geq 95th percentile).

For analysis in this study, overweight was defined as BMI at or above the 85th percentile for each gender.

The questionnaire was administered by duly trained personnel to ensure correct data capture.

Children who were overweight or who had any other disease were referred to the corresponding medical service unit.

Parental written and oral informed consent was requested and obtained. The study was approved by the Ethics Committee of the Faculty of Medicine of the Autonomous University of Tamaulipas (UAT), Mexico.

A sugar consumption antecedent was considered if the children consumed snacks (cookies, bread, candies, chocolate), fruit juice, non-diet or other sugar-containing drinks more than once a day during the six months prior to the study.

Family structure

This variable was defined based on the presence of the biological father, the biological mother, or of both biological parents in the children's home. Response options were: (1) both biological parents; (2) biological father and step-mother; (3) biological mother and stepfather; (4) a single biological parent; (5) one biological parent and other relatives, and (6) no biological parent. This variable was coded as (1) non-intact family (absence in the home of one or both biological parents), and (0) intact family (presence in home of both biological parents).

Educational level of the mother

The maternal educational level was determined according to the number of academic years of school attended. This variable was coded as (1) non-acceptable, if the academic level was not higher than complete secondary school, and (0) acceptable, if the academic level complete secondary school or higher.

Sedentary lifestyle of the children

This independent variable was constructed from the responses obtained to the following questions: (1) During how many weekly sessions does the child practice sports?, (2) How many minutes per session does the child practice sports?, (3) How many hours per day does the child watch television?, and (4) How many hours per day does the child devote to playing video games?. This independent variable was codified as (1) sedentary lifestyle and (0) non-sedentary lifestyle.

Practicing sports was considered acceptable if the children devoted one or more hours per day to exercise outside of school time for at least three times weekly. Conversely,

the time that the children devoted to watching television or playing video games was considered not acceptable if greater than two hours per day.¹⁹

Statistical analyses

Data were analyzed through the Statistical Package for Social Sciences (SPSS) v. 10.0. Some of the independent variables used in the study were continuous, while others were categorical. Distribution of the continuous variables was expressed as mean and standard deviation (SD), and categorical variables were expressed as frequencies (%).

Logistic regression models were performed to study the association between family structure, maternal educational level, maternal employment, and the outcome variable sedentary lifestyle. Adjusted odds ratios (OR) and their 95% confidence intervals (95% CI) were calculated. Dichotomous variables were used for indicating the presence or absence of a certain characteristic. A p-value < 0.05 was considered significant.

Results

The mean age of the sample was 9.86±1.49 years. According to BMI classification, the majority of the children had normal weight (59.3%). From the total sample, 40.7% of the children were overweight (22.3% were at risk of overweight and 18.4% were overweight). Approximately 57.2% of the children led a sedentary lifestyle. A non-intact family was reported by 23.5% of parents. A non-acceptable educational level was documented in 48.7% of the mothers, and 38.8% of the mothers worked outside of the home.

Table 1 shows the percentages of gender, family structure, maternal educational level, maternal employment, and sedentary lifestyle in at risk of overweight, overweight, and normal weight primary school-age Mexican children. The present results show that in the group of children at risk of overweight or overweight, the preva-

lence of non-intact family (29.3% vs. 19.5%) and maternal employment (44.4% vs. 35.0%) was higher than in children with normal weight. There was no difference in the prevalence of non-acceptable maternal educational level between overweight and normal weight children (49.0% vs. 48.5%).

A higher percentage of overweight children who led a sedentary lifestyle (Table 2) was found in those who resided in a non-intact family (65.4% vs. 53.1%) and who had a mother who worked outside of the home (62.3 vs. 52.2%), compared with sedentary overweight children living in an intact family and those without maternal employment. The results of the logistic regression model demonstrate that living in a non-intact family household (adjusted OR = 1.67; 95% CI = 1.04-2.66) is associated with sedentary lifestyle in overweight children.

Table 2 shows that the percentage of normal weight children with a sedentary lifestyle was higher in those who lived in non-intact family households (61.5% vs. 56.5%) and in those whose mother works outside of the home (61.3% vs. 55.5%). The logistic regression model analyses demonstrate that living in a non-intact family (adjusted OR= 1.11; 95% CI = 0.68-1.80), having a mother with a non-acceptable education level (adjusted OR = 0.83; 95% CI = 0.58-1.18), and having a mother who works outside of the home (adjusted OR= 1.16; 95% CI = 0.77-1.75) were not associated with sedentary lifestyle in normal weight children.

Discussion

Based on the present results, living in a non-intact family household, more than low maternal educational level or having a mother who works outside the home, appears to be associated with sedentary lifestyle in overweight primary school-age children.

Previous studies showed that living in a household with one, or no, biological parent favors the development of risk habits and behaviors, including abnormal eating habits, low

Table 1 Percentages of gender, family structure, maternal educational level, maternal employment, sports practices, television viewing, and sedentary lifestyle in overweight and normal weight primary school-age children.

	At risk of overweight (n = 200)		Overweight (n = 165)		Normal weight (n = 532)		Total sample (n = 897)	
	n	(%)	n	(%)	n	(%)	n	(%)
<i>Males</i>	116	58.0	88	53.3	270	50.8	474	52.8
<i>Females</i>	84	42.0	77	46.7	262	49.2	423	47.2
<i>Non-intact family</i>	67	33.5	40	24.2	104	19.5	211	23.5
<i>Maternal educational level</i>								
Non-acceptable	116	58.0	63	38.2	258	48.5	437	48.7
Maternal employment	92	46.0	70	42.4	186	35.0	348	38.8
Non-sports practice	95	47.5	79	47.9	196	36.8	370	41.2
Television watching > 2 h a day	91	45.5	82	49.7	242	45.5	415	46.3
Sedentary lifestyle	104	52.0	103	62.4	306	57.7	513	57.2

Table 2 Association of family structure, maternal educational level, and maternal employment with sedentary lifestyle in overweight and normal weight primary school-age children.

Sedentary lifestyle	Overweight (n = 365)				Normal weight (n = 532)			
	Yes/No	%	Adjusted OR (95% CI) ^a	p-value	Yes/No	%	Adjusted OR (95% CI)	p-value
<i>Non-intact family</i>	70/37	65.4	1.67 (1.04-2.66)	0.031	64/40	61.5	1.11 (0.68-1.80)	0.659
<i>Intact family^b</i>	137/121	53.1			242/186	56.5		
<i>Maternal educational level</i>								
Non-acceptable	99/80	55.3	0.96 (0.62-1.48)	0.855	141/117	54.7	0.83 (0.58-1.18)	0.305
Acceptable ^b	108/78	58.1			165/109	60.2		
<i>Maternal employment</i>								
No maternal employment ^b	101/61	62.3	1.37 (0.89-2.12)	0.152	114/72	61.3	1.16 (0.77-1.75)	0.456
	106/97	52.2			192/154	55.5		

95% CI, 95% confidence interval; OR, odds ratio.

^aAdjusted for all other variables.

^bReference category.

academic achievement, leisure activities, and sedentary behavior.²⁰⁻²² According to the analyses in this study, overweight primary school-age children who lived with one or no biological parent had 1.62-times greater risk of being physically inactive or sedentary compared with children who lived with both biological parents. This association was previously reported by Quarmby et al. who, on studying the associations between children's physical activities and sedentary behaviors and family structure, found that children who lived in non-intact family households had greater risk of physical inactivity compared with children living with both biological parents.²³ Some of the following factors can favor this effect: it is possible that the work activities of the mother or father do not allow them to carry out some essential parental duties such as supervision of the children's daily activities both inside and outside of the home, including accompanying them to or performing sports activities with the children.²³ It has also been suggested that parental non-attachment to sports activities is transferred to the children.^{24,25}

The study of the association between maternal educational level and children's physical inactivity has generated varying results.^{26,27} Sherar et al., in their study conducted on 77 girls in grades fourth through eighth, demonstrated that girls whose mothers had higher educational levels performed more vigorous physical activities.²⁷ Conversely, Bail et al., in their study of 542 children aged 5 to 12 years, found no association between maternal education and physical activity of the children.²⁶ The present results show that the prevalence of physical inactivity in overweight children is not associated with having a mother with a low educational level. It is possible that the different results are related with the sample size used or the design of the study conducted. The mechanism proposed by which a mother with a high educational level is associated with the adequate physical activity of children is that these mothers have better knowledge of the healthy effects of physical activity.

The results of studies on the association between maternal employment and physical inactivity in children are controversial.^{28,29} Some authors have found an association between maternal employment and physical inactivity or sedentary lifestyle, while others did not.^{13,16,29} The present data did not show an association between presence of a mother who works outside of the home and physical inactivity of overweight and non-overweight children. In Mexico, as in well developed countries such as the UK, the prevalence of mothers who work outside the home has increased over the past decades.²⁸ It is noteworthy that the presence of a mother who works outside of the home can contribute to a better familial economic level. However, the time that the mother spends at work outside of the home does not always translate into the well-being of her children, because the mother may be not able to prepare or supervise healthy meals at home, nor supervise the children's activities within as well as outside of the home, including physical activity. In some developed countries, this observation has given rise to a strong debate on whether both parents should work outside the home when the children are young, due to the negative impact on the children's development when both parents work.²⁸

This study has some limitations that should be taken into consideration when generalizing its results: (1) the data analyzed in this study was gathered through a self-reported questionnaire applied to the children's parents or guardians and to the children themselves; (2) invitations were issued to the children to participate in the study and they participated under the informed consent granted by their parents or guardians; (3) this was a cross-sectional study; thus, no causal relationship can be established.

According to the results, living in a non-intact family household, to a greater extent than maternal educational level or having a mother who works outside of the home, appears to be associated with a sedentary lifestyle in overweight children.

Conflicts of interest

The authors have no conflicts of interest to declare.

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